Smart Metering

Harold Hayes

Landis+Gyr
manage energy better

Landis+Gyr: Expertise, technology and solutions

… a century of experience and expertise in metering

- with over 300 million installed meters the market leader in electricity metering
- more than 25 years of experience in Smart Metering with over 100 AMI Solutions installed

… leading technology for changing needs

- involved in the most advanced Smart Metering projects in North America, South America, Europe, Africa and Australia
- helping utilities and their customers to exploit the advantages of smart technology

… committed to building the Smart Grid

- providing sustainable solutions to manage energy better

Smart Grid: Buzz – Bubble – Reality?

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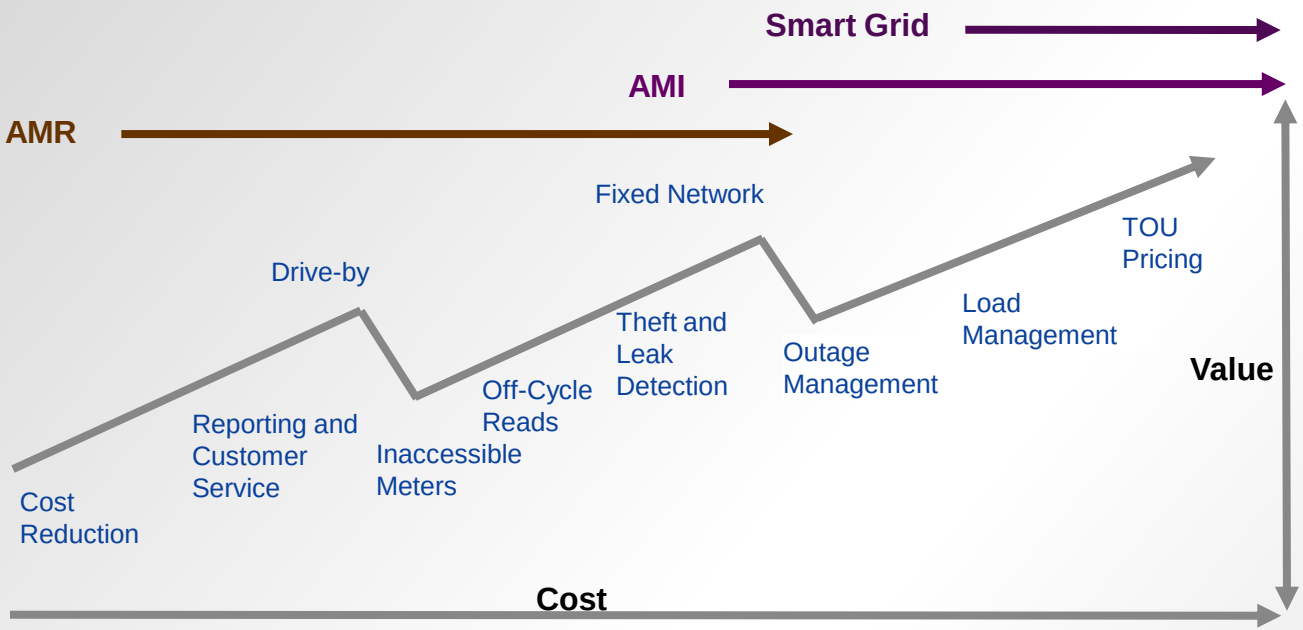
Global Evolution to Smart Grid



Smart Grid functionality 2009 and beyond

+ Dynamic pricing
+ Demand Response
+ Personal Energy Management
+ Distribution Automation
+ Substation Automation
+ Volt/VAR balancing
+ Fault detection and restoration
+ Renewables integration
+ Distributed energy management
+ Meter Tampering

New and replacement meters The past

+ Limited innovation
+ New housing projects
+ Replacement costs
+ Electromechanical to digital
+ Steady predictable growth

Automated Meter Reading - AMR Change: 1994-2006

+ Driven by improving operations and cost reductions
+ Higher price point
+ Additional products and services
+ Drives AMR meter and module growth
+ Prepaid meters

Advanced Meter Infrastructure - AMI *2006 and beyond*

+ Environmental concerns and conservation reaction
+ Legislation / regulation
+ Avoided costs of building generation or transmission
+ Efficiency gains
+ Ability to shave peak load

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Considerations

- Understanding that “Smart Metering Solution”
  - It is **NOT A METER** but a **SOLUTION**
- Back office Architecture, billing, interfaces, used cases, number of users, etc.
- Database or database structures, how often will meters be read, how will the data be processed and stored
- Communication; backhaul, point to point, radio, PLC, GSM, GPRS, 2G, 3G, 4G etc. consider costs and availability
- Open Standards, interoperability, compliance to international regulations not only meter testing or certification
- Consider the current asset base, equipment installed in the field today and COMMUNUCATIONS

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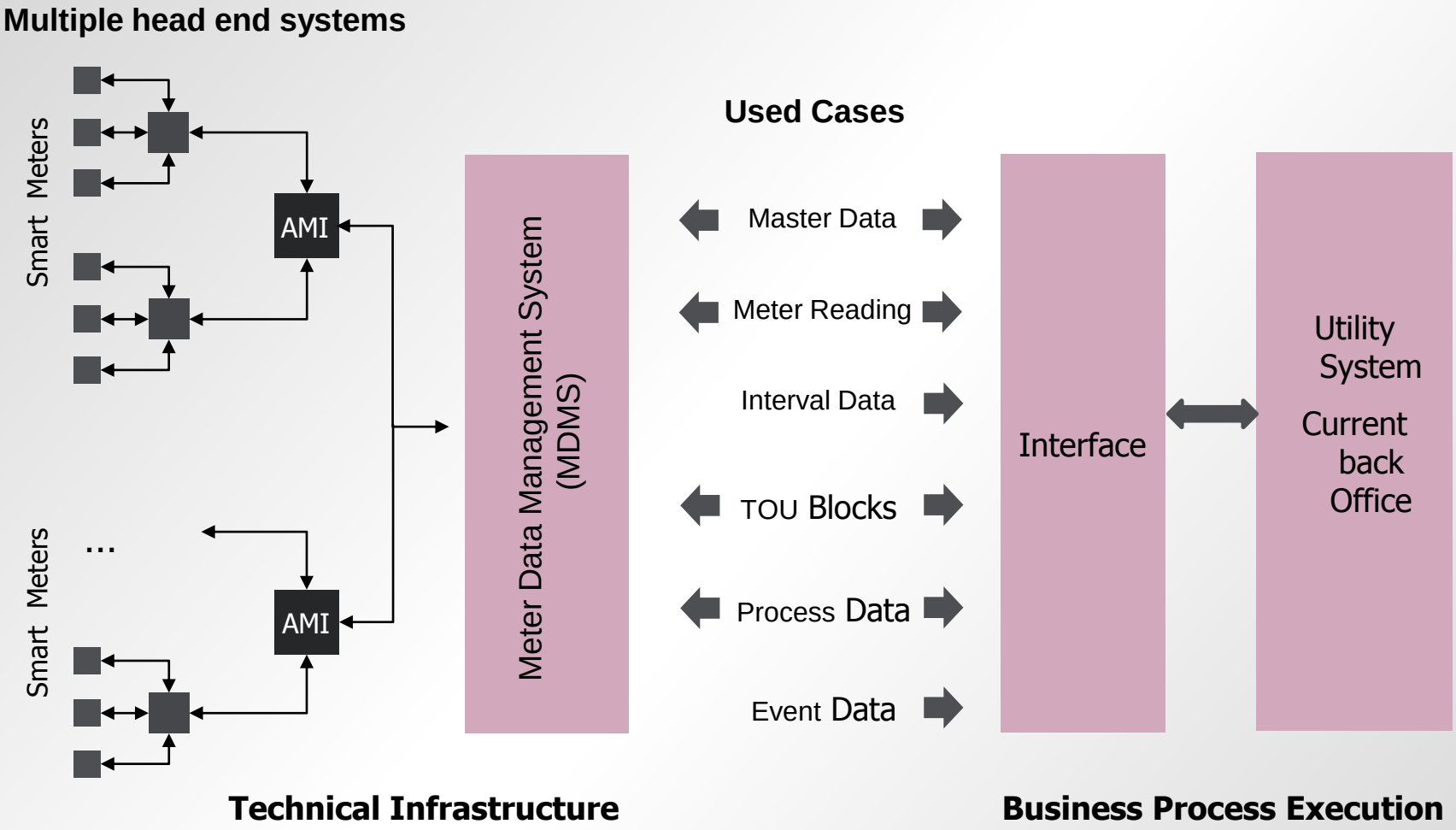
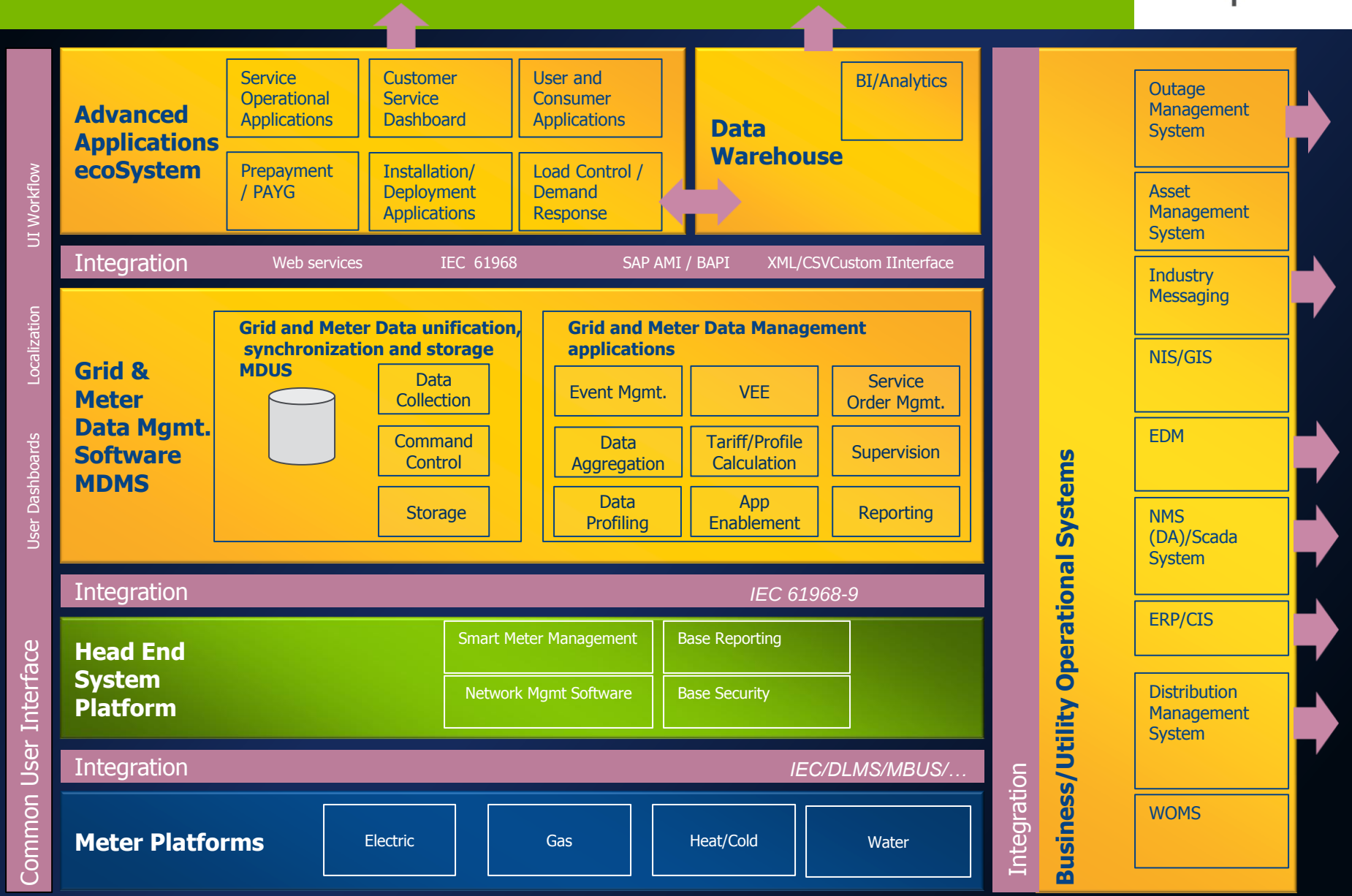
System architecture – Regulated market



Landis+Gyr Gridstream™: The future-proof Reference Architecture



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AMI Communication Technology: Building the connectivity for smart information

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Communications

Advanced Metering Infrastructure & Advanced Meter Management

Head End Software

Smart Router
Connected to Smart Grid

Smart Meter

Local Area Network

Utility enterprise network

- 100Mbps – 10 Gbps Ethernet
- Networked Storage
- Server Infrastructure

Wide Area Network (WAN)

Backhaul network between NAN & LAN

- GPRS/UMTS/3G
- UMTS
- Private Wireless
- BPL
- WiMax / LTE (4G)

Routers, towers, repeaters, wired backhaul

Neighborhood Area Network (NAN)

Link in end-to-end network; being deployed at scale

- PLC
- OFDM PLC
- GPRS/UMTS
- RF Mesh
- FFTH & WiMAX

Relays, modems, bridges, access points, routers

Connectivity to other Smart Grid equipment

Home Area Network (HAN)

Loads & appliances for utility & consumer control & mgmt

- ZigBee
- M-Bus
- 6LowPAN
- Providing HUN for multi energy

Grid aware devices, e.g. thermostats, appliances, energy portals & HAN infrastructure

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Advanced Metering Infrastructure – information for smart applications

Renewable Integration	Billing, Balancing & Settlement	...
Distribution & Substation Automation	Demand Response	New Services
Network Operations & Delivery Control	Asset Management	Outage Mmgt & Field Services

Advanced Metering Infrastructure

Head End Software

Smart Router

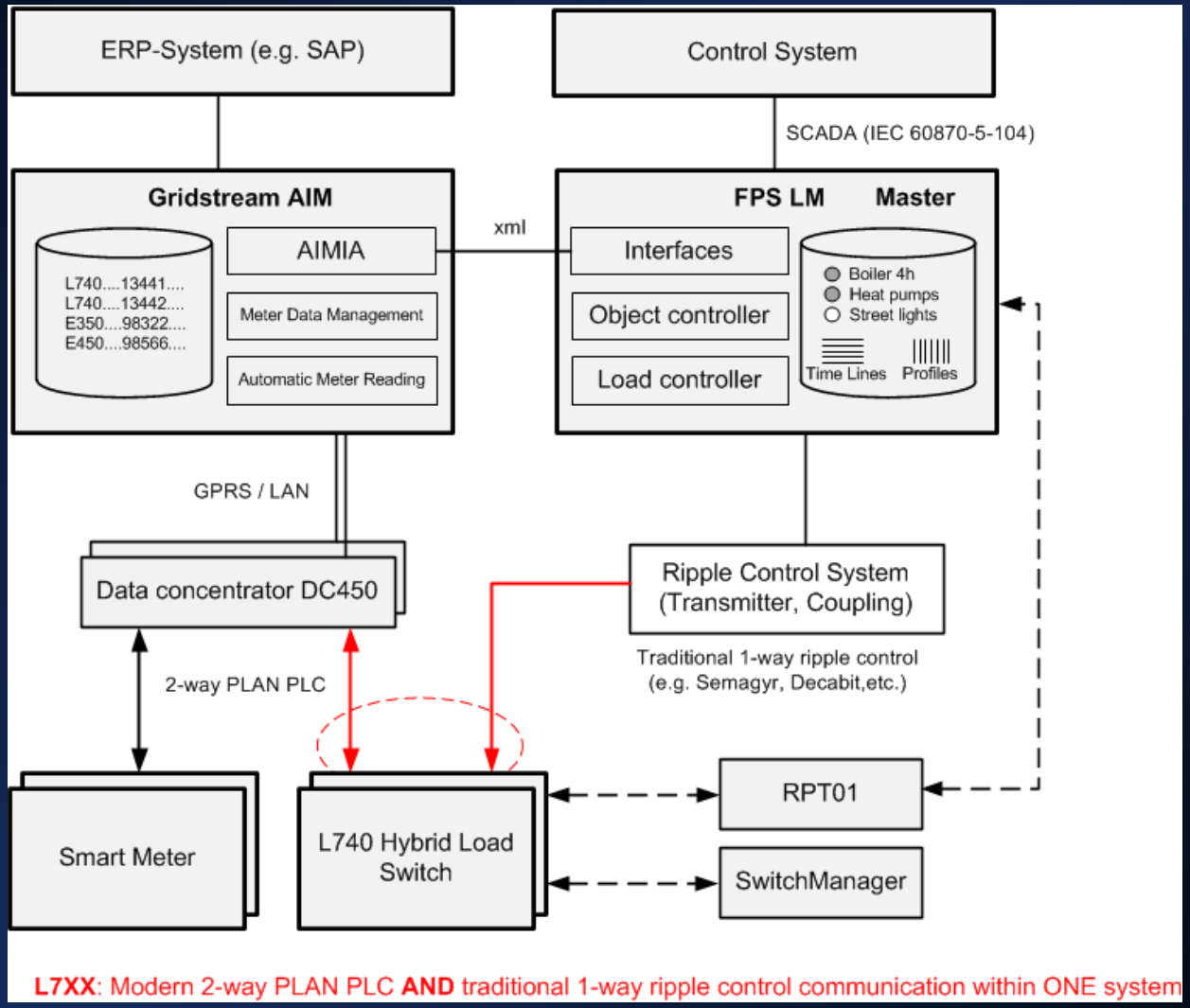
Smart Meter

Smart devices & appliances

Smart Metering	IHD's	Load / Demand Management
Smart Appliances & Thermostats	Micro Generation	Home Automation
Plug-in-Hybrid Vehicles & Storage	...	Personal / Residential Energy Mgmt.

3rd Generation LM in Gridstream Solutions

Consider the Current Installed Base



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The Smart Grid evolution – step by step

Open architecture for a future proof Smart Grid

Solid foundation

By building the AMM solution on a open, interoperable architecture,

+ you build a solid foundation for the future
+ easy to integrate smart grid applications
+ can be expanded to support any HES and MDMS using industry standards
+ the meter park can be built on several suppliers' products

Flexibility and scalability

The service oriented modular structure provides flexibility and scalability

+ choose only the needed functionality, and fit it into existing infrastructure
+ new modules easily added, as needs evolve
+ improving business processes with organization wide information

Prepare for business transformation

Enabling business transformation and developing business capabilities

+ Linking technology, information and applications
+ Visibility – Flexibility - Efficiency

System Security

- Gridstream security strategy for stepwise compliance with the requirements and recommendations of NISTIR 7628 and ISO 27001.
  - Implementing IDIS compliant security applying DLMS/COSEM for PLC-based communication between head-end system and meter in EMEA.
  - NSA standards-based algorithms in US including ECC and AES 256 Encryption.
- Integration partnerships with RSA and SafeNet for cryptography and key management.
- VPN for GSM/GPRS-based communication.
- Secure ZigBee SEP communication

Evaluate the best suitable partners

Landis+Gyr's eco system





Software, Apps & Integration	Distribution Automation	Communication	Metering	Personal Energy Management
MDM solutions, Data collection & aggregation Forecasting & tariffication	Demand side management …	Solutions & technology for PLC, GSM/GPRS, PSTN, RF mesh WiMax, Wi-Fi, ZigBee, 3G, IP	Electricity, gas, Heat/cold and water meters Prepayment solutions Devices for all applications with & w/o integrated communications	In-Home Displays Smart Phone Apps Web-Portal information
Partner network include Oracle, SAP Obvient, Siemens and others	Interfaces to solutions of industry leaders incl. ABB, GE, Siemens and others	Partnerships with various technology and services providers	Technical co-operation with major meter companies (e.g. IDIS)	e.g. Tendril Microsoft Hohm

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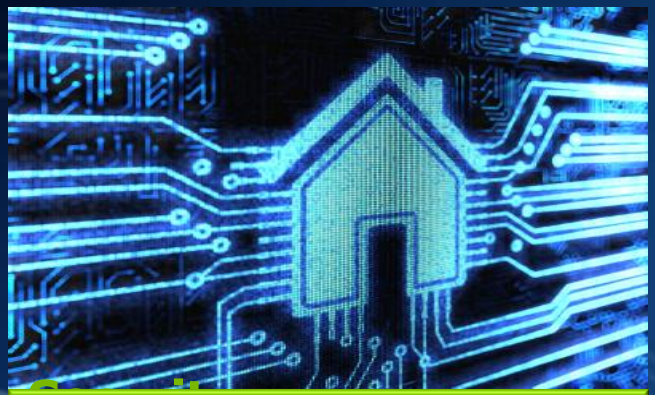
Partners

Experience beyond Technology - Key Lessons from our Global AMI deployments

1. Internal Preparation

2. Anticipate Future Requirements



3. Technical Decision Drivers

4. Customer Engagement

Key Lessons from Global AMI deployments

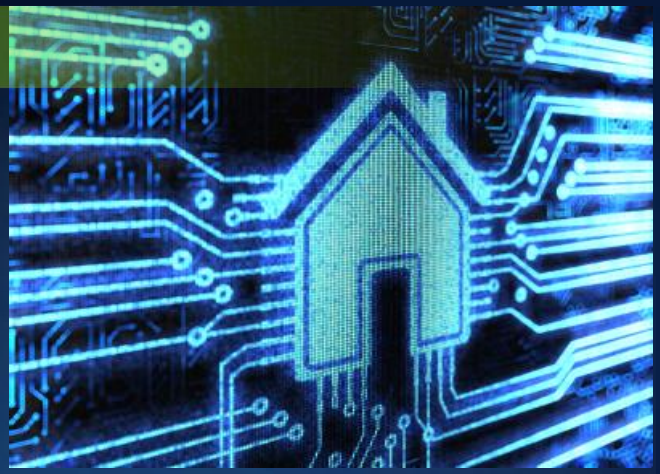
Internal Preparation

- Assess own competences
- Decide on the level of services required from vendors (turnkey, system integration, installation, operation)
- Determine required processes changes to capture all benefits of AMI implementation
- Plan integration into ERP systems
- Consider the impact on your organisation ...Business transformation

Key Lessons from Global AMI deployments

Technical Decision Drivers

- Assess own competences
- Develop strategy for Openness, Interoperability and Security
- Future proofing Smart Meter functionality (disconnect, memory, processor, downloadable firmware, HAN comms etc)
- Modular versus integrated communication
- Consider particular conditions in AMI deployment areas (e.g. weather, installation practices, etc.)



Key Lessons from Global AMI deployments

Customer Engagement

- Educate your customer base well ahead of the roll-out
- Show benefits to all: Government, Industry and community groups and particularly for end-customer
- Start developing tariff strategy early, TOU, MD, Prepay, real time pricing
- Increasing focus on HAN/PEM- define strategy upfront

Paving the way to the Smart Grid

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…solutions to manage energy better

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manage energy better

Thank you

Our Smart Grid vision

Enabling the Smart Grid

Smart meters…

…we leverage the meter to become the source of information for all processes but also for consumers aiming to use energy more sustainably and cost effectively

Providing information…

…we are strengthening energy utilities' competitiveness but also helping them to make a more sustainable usage of the energy infrastructure

Helping to manage energy better…

…we provide solutions to all users connected to the energy system helping them to manage energy better

Proven around the globe

	Competences	Sample cases
Smart Metering, DM, Pers. Energy Mgmt 	▪ End-points for electricity, heat, water and gas ▪ Various comms technologies including PLC, RF Mesh, GPRS / 3G, WiMax, ZigBee for HAN , NAN and WAN ▪ In-home Display Units & customer portals ▪ HAN functionality including e.g. load control and dynamic pricing	▪ British Gas/Centrica, UK ▪ SP AusNet, Australia ▪ PG&E, USA ▪ Oncor, USA ▪ ErdF, France ▪ Ampla & Light, Brazil
DR, DG & Storage, EV integration 	▪ End-to-end systems enabling real-time load analysis and control ▪ Transmitters , receivers, breakers and software ▪ Command capability allowing cost-effective centralized monitoring and control of large scale distributed solar deployments	▪ EKZ, Switzerland ▪ SP AusNet, Australia ▪ Kansa City Power & Light, USA
Distribution Automation 	▪ Switches, controllers and load survey meters including software to monitor and manage distribution networks ▪ End-to-end future-proof integrated solution, including Gridstream end-points with service switch, IHD's and distribution automation	▪ Southern Cal Edison, USA ▪ United Illuminating Company, USA ▪ CPS Energy, USA ▪ ESKOM, South Africa
Operations, Admin & Customer 	▪ Operational and field services for meter parks ▪ Design, installation and operation of fully redundant networks ▪ State-of-the-Art NOC (Network Operation Center) serving 15 million endpoints daily, 24hours a day, 365 days a year	▪ Ameren, USA ▪ Austin Energy, USA ▪ Colorado Springs Utilities, USA ▪ E.On Sweden, Sweden ▪ Puget Sound Energy, USA ▪ Xcel Energy, USA